



UNITED STATES NAVY

# MEDICAL NEWS LETTER

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HISTORICAL FUND  
of the  
NAVY MEDICAL DEPARTMENT

A committee has been formed with representation from the Medical Corps, Dental Corps, Medical Service Corps, Nurse Corps, and Hospital Corps for the purpose of creating a fund to be used for the collection and maintenance of items of historical interest to the Medical Department. Such items will include, but will not be limited to, portraits, memorials, etc., designed to perpetuate the memory of distinguished members of the Navy Medical Department. These memorials will be displayed in the Bureau of Medicine and Surgery and at the National Naval Medical Center. Medical Department officers, active and inactive, are invited to make small contributions to the fund. It is emphasized that all donations must be on a strictly voluntary basis. Funds received will be deposited in a Washington, D. C. bank to the credit of the Navy Medical Department Historical Fund, and will be expended only as approved by the Committee or its successor and for the objectives stated.

It is anticipated that an historical committee will be organized at each of our medical activities. If you desire to contribute, please do so through your local historical committee or send your check direct, payable to Navy Medical Department Historical Fund, and mail to:

Treasurer, N. M. D. Historical Fund  
Bureau of Medicine and Surgery (Code 23)  
Department of the Navy  
Washington 25, D. C.

Committee

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Biological Warfare Medical DefenseProblems Posed to the Medical  
Department by BWPart I

If Biological Warfare (BW) were initiated, it would potentially pose problems of serious magnitude to the medical services of the Armed Forces. Although these problems would be basically similar to those encountered in the control of naturally occurring infectious diseases, there are sufficient differences in their potential magnitude and in methods of control to necessitate a separate consideration of medical countermeasures as they specifically apply to BW defense. It is intended at this time to discuss in general terms BW medical defense as it applies to the Navy Medical Department.

By definition, BW is the intentional use of microorganisms or their toxic byproducts to produce disease in man, plants or animals. In this discussion, remarks will be restricted to antipersonnel BW.

Because BW has never been employed, except perhaps in a very amateurish and limited fashion, the determination of the need for medical defense has been based on knowledge of infectious diseases in general and on research.

In the event BW were initiated, the Medical Department would have certain primary responsibilities which are as follows:

1. Recognition of BW outbreak through epidemic intelligence and identification of BW agents when biological procedures are involved.
2. Certification of suitability of food and water for consumption.
3. Prophylaxis and Therapy.
4. Self-Aid and First-Aid.
5. Mass casualty handling and evacuation.
6. Epidemiological countermeasures.
7. Decontamination of casualties and advisory supervision of decontamination of other personnel.

To appreciate the problems that would be posed to the medical services, it is essential to realize that BW attacks can be made utilizing a variety of means to disseminate the agents. However, for the sake of simplification, it is appropriate to consider them from the point of view that an attack may or may not be detected prior to the occurrence of casualties. A covert attack by a saboteur implies nondetection and, in many instances, an overt attack may not be detected immediately or even prior to the appearance of casualties. This would probably be the case when an overt attack is delivered a considerable distance upwind of the target.

Overt and covert attacks would disseminate the BW agent in such a fashion that exposure would occur principally via the respiratory, gastrointestinal, subcutaneous or cutaneous routes. A sabotage attack would involve any of the routes of exposure, but would most likely involve the respiratory and gastrointestinal routes, for example, by release of aerosols or by direct contamination of food and water. Overt attacks would probably involve most directly the respiratory and subcutaneous routes, for example, exposure to aerosols or arthropod vectors. An aerosol attack would also secondarily cause a certain number of casualties because of contaminated food and water and from cutaneous and subcutaneous infections due to residual environmental contamination.

Medical defense must be considered in relation to other available defensive countermeasures. Nonmedical countermeasures have been devised to prevent exposure of personnel, whereas medical countermeasures are intended to control exposure once it has occurred. A partial exception to this generalization is the prevention of exposure by sanitary control and treatment of food and water in which the Medical Department has the responsibility for certification of those items as being safe for consumption. In addition to decontamination procedures, nonmedical countermeasures to prevent exposure to aerosols are based on utilization of physical protection devices, such as the mask and protective shelters.

The principal limitation inherent in physical protection is that warning of the presence of BW agents, and especially aerosols, may not be obtained in time to allow utilization of the appropriate devices prior to exposure. In fact, the occurrence of casualties may be the first indication that exposure had occurred.

In an attack which was detected in time to utilize physical protection devices, the Medical Department will be a highly essential secondline of passive defense, whereas, in the event the attack is not detected prior to the occurrence of casualties, the Medical Department will be a principal first-line of defense. Because attacks made by saboteurs implies that the attack will not be detected and, because overt attacks may also not be detected in time to give adequate warning, it becomes apparent that the Medical Department plays a highly essential role in passive defense against BW.

It is not possible to predict which agents might be used against us in a BW attack. It is best to assume that they might be any of a variety of bacterial, viral, rickettsial or fungal agents or that toxins produced by microorganisms may be encountered. They may be drug and antibiotic resistant and vaccines may not be available. They may possibly have the potentiality for producing a self-propagating epidemic. Some of the agents may be highly persistent and require rigorous decontamination measures if they are to be removed from the environment.

Although BW infections are basically the same as naturally occurring infections, there are certain factors which make it necessary to consider



BW a means of producing specific problems not normally encountered. Some of the factors are:

1. Pathogens otherwise rarely encountered may be used.
2. Excessive virulence of agent may be encountered.
3. Agent may be artificially drug and antibiotic resistant.
4. Air, especially in overt attacks, will probably be the principal common vehicle of exposure, rendering usual procedures to prevent exposure by usual portal of entry largely ineffective insofar as the primary cases (those exposed to the primary aerosol) are concerned.
5. Exposure will probably be to much higher concentrations of agent than is encountered naturally.
6. Aerosols of agent will probably consist largely of particles small enough to penetrate to the alveolar spaces of the lungs. This may largely circumvent any evolutionary protection that has been developed against naturally occurring airborne infections that may be due to removal of particles from the inspired air by the upper respiratory passages.
7. The portal of entry, by being unusual for the specific pathogen involved, may produce a somewhat different symptomatology and a more severe disease. Diagnosis may be confused.
8. It is possible that exposure may be to mixtures of agents which might complicate identification and diagnosis.
9. Epidemic intelligence to detect and recognize nature of outbreak will be more critical.
10. Rapidity of identification of agents will be more urgent since large numbers of personnel may have been exposed to the primary aerosol or other primary inoculum of the agent. This is especially critical in a military organization where duration and rate of morbidity, as well as the mortality produced, are so important and will necessitate an effort to identify the agent in nonclinical samples collected during, or immediately after, the attack (to take advantage of the incubation period). Depending upon the agent, any delay in specific prophylaxis, and especially in specific therapy, may result in a much higher rate and duration of morbidity and in a higher case fatality rate. This may also indicate the necessity for obtaining logistic reinforcement during the incubation period if that is possible.
11. Laboratory techniques for identification of agent in nonclinical samples are different in certain respects than when clinical samples are analyzed. Samples, such as those taken of aerosols from dud munitions or malfunctioning spray devices, are better than clinical samples because they are available earlier and, except for the aerosol samples, because of the highly concentrated agent present. On the other hand, other types of environment samples may be highly

contaminated with nonspecific microorganisms. Determination of drug and antibiotic sensitivity of the agent concurrent with its identification will be important since artificially resistant strains should be expected.

The mission of the Medical Department remains the same whether infectious diseases are naturally occurring or are induced by a BW attack. The Medical Department's objectives will be to prevent morbidity, reduce the period of morbidity, and to minimize the case-fatality rate. It is well to point out that a BW-induced outbreak will often be comparable, except in magnitude, to a naturally occurring common exposure explosive type outbreak. In BW, especially if the airborne route of infection is involved, there is a potential for producing within a short period of time an unusually high attack rate. It is possible that a major proportion of the personnel of an activity may be casualties at the same time. The percentage of casualties may surpass the "neutralizing percentage," a percentage which renders the attacked unit unable to perform its mission either offensively or defensively. The "neutralizing percentage" would vary from unit to unit and under different circumstances. It would seem appropriate to state for the purpose of emphasis that an additional objective of the Medical Department in defense against BW would be to prevent the occurrence of a "neutralizing percentage" of casualties. It is potentially possible to accomplish this last objective, even after exposure has occurred, if adequate countermeasures are instituted promptly, especially if instituted prior to occurrence of the first casualties, by taking advantage of the incubation period to identify the agent and thus to determine which countermeasures would be appropriate. The key to specific countermeasures and early application of those countermeasures is early identification of the agent and determination of the agent's sensitivity to the various drugs and antibiotics. Unfortunately, however, many agents could either be naturally resistant or could have been made artificially resistant.

Medical countermeasures are essentially the same as those routinely used in control of naturally occurring infectious diseases. However, because time becomes a more critical factor in BW outbreaks, particularly if prevention of a "neutralizing percentage" of casualties is to be accomplished, it is necessary to modify and emphasize certain aspects of the standard type of medical operations.

First, to take advantage of the incubation period in determining appropriate countermeasures, it is necessary to establish a means of collecting BW agents during or immediately after the attack, assuming the attack has been detected. Nonclinical samples of the agents could be collected from a variety of sources, such as aerosols, dud munitions, food and water, environment, et cetera. Secondly, because analysis of samples to identify or determine the presence of the agent requires adequately trained personnel and equipment and supplies, in addition to those normally used in a diagnostic



laboratory, it is necessary to establish an organization for the processing and handling of the nonclinical types of samples collected during, or immediately after, an attack. Thirdly, if the attack was not detected, but was suspected prior to the occurrence of casualties, it would be essential to collect clinical samples from the first cases in order to take advantage of the range of the incubation period in determining appropriate countermeasures. Finally, in the event the attack was not suspected prior to the outbreak, the epidemiological investigation would offer the first indication that a BW attack had occurred and, consequently, it is essential that the local medical department be alert to the occurrence of unusual outbreaks from the standpoint of its possible BW implications.

Establishment of an effective epidemic intelligence system will be of the utmost importance. An unusual outbreak perhaps can best be defined as one that cannot be readily explained on a naturally occurring basis. The Preventive Medicine Units should be consulted and a prompt investigation should be made by an epidemiologist to determine whether an outbreak is unusual and possible due to a BW attack. The occurrence of an explosive large-scale outbreak of a nonendemic disease would be highly suspicious. The epidemiologist would also recommend appropriate epidemiological countermeasures. (Concluded in the next issue of the News Letter)

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### Pain of Coronary Heart Disease

The three most common clinical manifestations of coronary heart disease are, in their order of frequency, angina pectoris, acute myocardial infarction, and acute coronary failure. Each of these conditions is characterized by pain in the chest due to anoxia of one or more areas of the myocardium. The pain is similar in location in all three and the syndromes are distinguished from one another chiefly by the length of time the distress persists and by whether the anoxia is of sufficient severity and duration to result in the death of myocardial tissue. Pain in the chest may also be caused by many other conditions. In most of these, the clinical history clearly indicates a noncardiac source. In some, however, the discomfort strongly suggests myocardial ischemia, and diagnostic errors can be avoided only by detailed analysis of the symptoms and thorough examination including electrocardiographic and roentgenologic study.

Angina Pectoris. Attacks of angina pectoris may be induced by exertion, emotion, a large meal, sudden exposure to cold, or a disproportionate reduction in coronary blood flow during sleep. The pain typically originates in the retrosternal area, most commonly in the middle or upper third and may or may not radiate to one or both upper extremities, the neck, jaws, roof of the mouth, mid-dorsal or left scapular region, or the epigastrium. When induced

by exertion, the distress usually is mild at the very beginning and then rapidly becomes so severe that the patient is quickly forced to cease all activity. Rest as a rule gives relief within a few minutes, and nitroglycerin almost always shortens the duration of symptoms still further. Many persons describe their discomfort not as actual pain, but rather as a sense of constriction, tightness, gas, choking, burning, pressure, aching, heaviness, or fullness. There may be an accompanying desire to belch. In these instances, the patient often attributes his symptoms to indigestion rather than to exertion and may be of the opinion that relief depends more on getting rid of a small amount of gas than on rest.

Instead of arising in the substernal area, the pain of angina pectoris may first be felt in any one of a number of less typical locations, such as the precordium, lower left axilla, right or left infraclavicular region, mid-dorsal or left scapular area, various parts of one or both upper extremities, the throat, jaws, or epigastrium. There is often prompt radiation from these less common sites of origin to the substernal region and knowledge of this is of help in diagnosis. If such radiation does not occur, the distress may be wrongly interpreted unless careful inquiry is made concerning the relationship to exertion, emotion, or meals, and the relief afforded by rest. A therapeutic trial with nitroglycerin may help to clarify the diagnosis.

Acute Myocardial Infarction. The pain of acute myocardial infarction is similar in location and radiation to that of angina pectoris but, with exceptions, is of greater severity. It usually lasts for more than one-half hour and often for several hours depending on the size of the infarct, the patient's tolerance to pain, the state of the sensorium, and the promptness with which treatment is started. Nitroglycerin is without effect and morphine gives only gradual relief. Symptoms of shock of mild to severe degree frequently appear soon after the onset. These features readily distinguish myocardial infarction from angina pectoris, but do not differentiate it from the syndrome of acute coronary failure. Confirmation of a clinical diagnosis of acute infarction rests entirely on the development of evidence of acute necrosis of myocardial tissue. Fever, leukocytosis, elevation of the erythrocyte sedimentation rate, a rise in serum glutamic oxalacetic transaminase activity, a pericardial friction rub, and characteristic changes in the electrocardiogram are the chief manifestations of this process; one or more of them must appear subsequent to the onset of symptoms before the diagnosis can be considered established. Fever and leukocytosis usually develop within 24 to 48 hours after the onset of pain, and the erythrocyte sedimentation rate becomes accelerated within the first 3 or 4 days.

A few conditions exist which may present a more difficult problem in differential diagnosis. The most important are acute nonspecific pericarditis, pulmonary embolism, and other conditions which cause a sudden or severe increase in pressure in the pulmonary artery, and dissecting aneurysm of the aorta.



Acute Coronary Failure. In 1940, Blumgart and his associates focused attention on a previously neglected form of coronary heart disease characterized by attacks of substernal pain of longer duration than in angina pectoris, but not followed by clinical or electrocardiographic evidence of myocardial infarction. The physiologic basis for the pain in this condition is the same as in angina pectoris, namely, a reversible myocardial anoxia. The anoxia lasts longer than in angina pectoris, but not long enough to cause myocardial necrosis. The pain persists for 20 minutes or longer, may be of any intensity from mild to severe, and at times is accompanied by some respiratory distress, sweating, and weakness. Nitroglycerin fails to give more than partial and temporary relief. Fever, leukocytosis and an elevated sedimentation rate do not occur, and there is no significant increase in serum glutamic oxalacetic transaminase activity. Electrocardiograms made during the attack may show changes similar to those which occur in many patients during seizures of angina pectoris. The changes when present, are of short duration and subsequent tracings fail to show the serial alterations of acute infarction. Acute coronary failure must be distinguished not only from angina pectoris and acute myocardial infarction, but also from the various disturbances which may simulate either of these conditions. Recognition of the syndrome is important because, among other considerations, the attacks at times represent the premonitory symptoms of impending infarction.

In most noncardiac conditions which cause pain in the chest, the clinical history clearly indicates the source of the symptoms. However, the precordial discomfort of neurocirculatory asthenia and anxiety states often is interpreted erroneously; there are several conditions which produce pain highly suggestive of coronary heart disease. Esophageal hiatus hernia, cardiospasm, or spasm of the esophagus, and osteoarthritis of the upper dorsal spine may cause distress similar in location to that of angina pectoris. The pain of these conditions usually can be differentiated from that of angina pectoris on the basis of differences in precipitating factors, duration, and the measures which give relief. In the anterior chest wall syndrome, periodic exacerbations of pain are common and may be wrongly attributed to angina pectoris or to repeated episodes of acute coronary failure. Distinguishing features include a lack of relationship to walking, failure to respond to nitroglycerin, and the absence of electrocardiographic changes during the paroxysms. The pain of massive pulmonary embolism, acute idiopathic pericarditis, dissecting aneurysm of the aorta, spontaneous mediastinal emphysema, and spontaneous rupture of the esophagus may closely simulate that of acute myocardial infarction. Errors in diagnosis can be avoided by detailed analysis of the symptoms and thorough examinations including electrocardiographic and roentgenologic study. (Ernstene, A. C., *Differential Diagnosis of the Pain of Coronary Heart Disease: Ann. Int. Med.*, 46: 247-254, February 1957)

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### Drug Addiction

There are several reasons for discussing the problem of drug addiction. In the first place, drug addiction is not the huge problem that it has been built up to be by the public press in the past few years. There are probably no more than 60,000 drug addicts in the whole United States, and so, addiction does not assume the proportions of an epidemic disease.

Drug addiction in and of itself can be divided into two categories which have some usefulness in terms of etiology, management, and outlook. About 80% of the drug addicts admitted to the hospital for treatment of narcotic addiction at Lexington, Ky., are what might be termed "social" addicts. These individuals come largely from urban areas and have been introduced to drugs through illicit channels; in them, addiction disease is a sociologic manifestation more than anything else. Negroes and Puerto Ricans far outnumber whites in this type of addiction. Approximately 20% of the individuals admitted to the hospital at Lexington, however, are what could be termed "medical" addicts. In these, the addiction has stemmed from the administration of drugs by physicians for therapeutic purposes and they are almost wholly dependent upon physicians for their continuing supply of narcotic drugs. This discussion is concerned primarily with this 20%.

The physician undertakes a grave responsibility when he uses narcotic drugs for the management of a chronic pain problem. He has three types of responsibilities in this situation. First, he must manage incapacitating pain; second, he must provide the best possible management plan for long-term smooth rehabilitation leading to elimination of the condition causing the painful symptoms; and third, he must follow one of the cardinal principles of the physician's function, namely, to do no harm as he attempts to rehabilitate.

Morphine is not the answer to chronic pain. Because of the development of tolerance to the analgesic effects of morphine and other narcotic drugs, alleviation of pain soon becomes inadequate. Under such circumstances, the physician by gradually withdrawing narcotics does not deprive the patient of any actual benefit, but protects him and his family from the possible legal, social, or economic difficulties attendant on narcotic addiction. The administration of morphine to a patient with chronic pain is short-lived kindness. Long-term kindness would begin when opiates are withheld or withdrawn in favor of other therapeutic measures.

Drug addiction, per se, is defined. The use of the term "addiction" has been broadened so that it is almost meaningless; for the purposes of this discussion, the term should be limited to a fairly narrow category. The first phenomenon is the development of physical dependence. Long-term administration of narcotics in large enough doses inevitably results in the production of a syndrome that requires the continuing administration of these drugs in order to prevent the appearance of certain objective



physiologic reaction. Morphine in doses of 1/4 gr. given six times a day for 3 weeks to nonaddicts produces this kind of physical dependence in most individuals.

The second phenomenon which is concomitant with, and often precedes, the development of physical dependence, is that of psychologic dependence. This situation arises primarily because the patient has discovered that he is relieved of a great deal of psychologic tension and need for psychologic adaptive behavior through the administration of the drug, and then uses it almost exclusively as his adaptive behavior pattern. The psychologic dependence has a certain readiness and there are several predisposing factors that make it one of the leading hazards in prescribing drugs for the relief of a painful syndrome. Perhaps one of the most striking of predisposing hazards is preexisting alcoholism in the present or the past of the patient. Other predisposing factors that should be taken into account are other evidences of neurotic behavior in the patient, extreme degrees of anxiety and overdependent attitudes toward the physician, and previous psychotic episodes.

The third phenomenon of the addiction syndrome is the development of tolerance. This is very simply the gradually increasing need for more of the drug to achieve the same effect as time passes. This is the phenomenon that should be the initial hint to the physician that all is not going well in his management plan and it is this phenomenon that frequently gives the practicing physician the most trouble in dealing with patients with painful symptoms.

Avoidance of the state of addiction can best be done in the first place by exact diagnosis, both medical and psychiatric, as to the cause or causes of pain, eliminating the possibility that the complaint of pain may be an expression of psychic pain or events in the environment which obviously cannot be dealt with by any pharmacologic agent. Second, the physician must develop a management plan over a long period, using foresight as to what his step will be when drugs are not adequate. The details of this plan should usually be shared with the patient. Third, if it is decided that narcotic drugs must be resorted to, the physician should give careful consideration to the selection of appropriate drugs of which a wide variety are now available; he should bear in mind the fact that he must continually avoid the possibility of toxic side reactions and the development of the tolerance phenomenon by paying attention to how long he presumes he will have to give such drugs and to the type of pain that he is attempting to relieve.

The classes of drugs causing addiction are:

Morphine Group. Morphine is the prototype of all narcotic drugs and can readily be used as a standard with which to compare the effectiveness and side effects of other narcotic drugs. This group also includes dilaudid, heroin, and pantopon. Codeine is not included in this discussion because it is rare for one to become addicted to it and this is a relatively safe drug if used with any kind of discretion.

Meperidine Group. This group of drugs which is perhaps the most misused and the most favored medically consists of the meperidine drugs, the prototype of which is demerol.

Morphinian Group. This group of drugs consists of the morphinelike drugs, the prototype of which is levodromoran.

Methadone Group. These drugs consist of the methadone drugs, the prototype of which is methadone hydrochloride.

If addiction to narcotics becomes or presents as a problem, persons who have become addicted during treatment for illness may accept withdrawal from narcotics in much the same cooperative spirit that treatment of other complications is accepted by a patient recovering from an abdominal operation. The factors associated with the addiction of persons who have access to illegitimate sources of supply are absent. The person remains motivated by the social condemnation of opiate addiction. The physician has the same continuing responsibility to his patient for the treatment of medical narcotic addiction that he would have for other therapeutic complications. To dismiss a patient from care soon after realizing that he is addicted is both physiologically and psychologically unjustifiable and socially unsound. Planned withdrawal from narcotics should be attempted after the patient has been informed that he will experience an uncomfortable, but relatively brief and definitely self-limited, period. If withdrawal fails because of marked manipulative behavior directed at securing narcotics, arrangements should be made for direct admission to an institution for the treatment of narcotic addiction. (Faucett, R. L., Drug Addiction and Other Considerations in the Management of Pain with Narcotic Drugs: Proc. Staff Meet. Mayo Clin., 32: 45-54, February 6, 1957)

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### Essential Hyperlipemia

Hyperlipemia is a clinical state characterized by an increase in the neutral fat fraction of the blood lipids. When this increase is of sufficient degree, the serum has a grossly milky or chylous appearance.

Three types of hyperlipemia are recognized. Alimentary hyperlipemia is a physiologic phenomenon, the neutral fat content of the blood reaching a peak 4 to 6 hours after ingestion of a fat-rich meal. It is unaccompanied by an increase in serum cholesterol or phospholipids. Secondary hyperlipemia has been described in diabetes mellitus, the nephrotic stage of chronic glomerulonephritis, pancreatitis, myxedema, starvation, vonGierke's disease, Niemann-Pick disease, amyloidosis, renal vein thrombosis, and toxic hepatoses. In Essential hyperlipemia, there is no apparent cause for the hyperlipemia. A familial tendency has been noted and a genetic factor



postulated. In essential hyperlipemia, there is often a concomitant, but less marked, rise in serum cholesterol and phospholipid concentration. Ultracentrifugal lipoprotein patterns show characteristic marked elevations of the low-density lipoprotein classes. Transient glycosuria and elevations of the blood sugar levels have been described.

Approximately 65 cases of essential hyperlipemia have been reported with males predominating. To date, the disorder has been reported in only two Negroes. It may occur at all ages from infancy to old age.

Clinically, essential hyperlipemia is characterized typically by recurrent abdominal pain, hepatosplenomegaly, cutaneous xanthomatosis, and lipemia retinalis. Secondary hypersplenism, relieved by splenectomy, was reported in one case. Any or all of the typical manifestations may be absent. The diagnosis is frequently made by the accidental discovery of a milky serum.

Abdominal pain was found to be a prominent complaint in over one-half of the reported cases. The pain varied considerably in severity, location, and frequency. In some instances, it was accompanied by fever, leukocytosis and increased sedimentation rate. The cause of abdominal pain in essential hyperlipemia is obscure.

Striking similarities exist between the abdominal crisis of essential hyperlipemia and the syndrome of relapsing pancreatitis. The observations of Poulsen and the extensive studies of Klatskin and Gordon indicate that when relapsing pancreatitis and essential hyperlipemia occur together pancreatitis is the result rather than the cause of hyperlipemia. Further evidence of this relationship is presented in other cases of pancreatitis and essential hyperlipemia in which xanthomatosis has appeared before the onset of abdominal pain.

It is possible, but unlikely, that hyperlipemia may produce abdominal pain by producing xanthomatous or atherosclerotic lesions in the pancreas and other viscera.

Many observers have shown that a low fat diet can control—to some extent at least—the degree of hyperlipemia and the abdominal crises. A rapid decrease in the lipoidal cells in the liver and bone marrow was produced by such a diet. Intravenous heparin usually produced a prompt and perceptible decrease in serum turbidity in essential hyperlipemia and an absolute decrease in fat content. A shift toward lipoproteins of higher density was reported; recently, Hollister and Kanter reported similar results with chlorpromazine, possibly mediated by its adrenolytic activity.

The observations made on essential hyperlipemia suggest that it may be the result of (1) a basic defect in the normal lipemia-clearing mechanism, (2) a constitutional over-responsiveness of the fat depots to the normal fat-mobilizing stimuli, or (3) the presence of an abnormal fat-mobilizing stimulus. (Corazza, L. J., Myerson, R. M., Essential Hyperlipemia - Report of Four Cases with Special Reference to Abdominal Crises: *Am. J. Med.*, XXII: 258-262, February 1957)

### Herpes Zoster

Herpes zoster is a self-limited disorder which in most cases resolves without complication. In some patients, herpes zoster produces complications during the acute phase of the disease and may produce sequelae that later may incapacitate the patient. The most important among these is postherpetic neuralgia. The severity of the latter has stimulated the interest of many investigators who are searching for ways to avoid such undesirable sequelae by treating the acute phase.

This paper illustrates some factors that play a role in the final severity of the disease, provides a general outline of its natural course, and provides a "base-line" useful in determining the results of future therapeutic measures. The statistical clinical study of 487 patients with herpes zoster by Katayama had a scope somewhat similar to that of this article.

The records of 916 patients with the diagnosis of herpes zoster or postherpetic neuralgia were reviewed. Sex distribution was essentially even, 445 females and 471 males.

As age increased, the number of patients included in the age group was greater: from 24 patients less than 20 years of age to 270 patients in their 60's. The group aged 70 years or more included 160 patients, absolutely a smaller number, but actually larger considering the relatively smaller percentage of population in this age group.

The most frequent associated diagnosis in these patients was that of lymphoma which was made in 39 cases (4.2% of the total number of cases).

Special attention was paid to the trigeminal location of the herpes zoster. Consistently, the postherpetic neuralgia was of longer duration in this group of patients than in all patients. Also, this group was more prone to have severe complications during the acute phase of the disease. Enucleation of the eye was done in 2 cases, owing to perforation of the cornea and to absolute glaucoma. Complete loss of vision of the involved eye occurred in 2 cases owing to corneal scars and to glaucoma.

All age groups received approximately the same type of treatment during the acute phase of the disease. Acetylsalicylic acid, autohemotherapy, and roentgentherapy were the more widely used. To relieve postherpetic neuralgia, roentgen therapy, cobra venom, Pituitrin (posterior pituitary extract) and Protamide (a proteolytic enzyme preparation), and vitamins B<sub>1</sub> and B<sub>12</sub> were used in most cases. Different attempts to block the nerves of the area where the herpes zoster was located were tried. Infiltration of procaine hydrochloride which was performed in 14 cases was of help in 2 instances. Infiltration of alcohol which was performed in 23 cases was of help in 2 cases. Avulsion of the nerve which was performed in 6 instances was of no value.

Subarachnoid injection of alcohol was of no help in 4 cases; one patient had complete disappearance of pain and another died of transverse myelitis.



Rhizotomy which was done in 8 cases provided complete relief in 3 cases, improvement in 1 case, and was of no help in 3 cases. In the remaining case, death occurred from a pulmonary complication a few days after operation. Section of the lateral tract of the spinal cord was of no help in 3 cases. Frontal lobotomy was helpful in 1 case and of no value in 2 other instances. Drug addiction due to morphine occurred in 4 cases.

Distribution of patients in the different age groups shows a progressive number and lengthening of the duration of postherpetic neuralgia as the age increases. In other words, the prognosis of herpes zoster as defined by the duration of associated neuralgia seems to be related primarily to the age of the patient. All patients in the different age groups received approximately the same type of treatment at the time of the herpes zoster. If treatment is good only in the younger age group and is unable to control pain in the older group, it is not very valuable. Treatment having a beneficial influence should affect all groups equally. In this series, the authors were unable to find any specific measures that affected markedly the natural course of the disease. (deMoragas, J. M., Kierland, R. R., The Outcome of Patients with Herpes Zoster: Arch. Dermat., 75: 193-195, February 1957)

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#### Pulseless Disease

Pulseless disease is a clinical entity due to slowly progressive thrombotic occlusion of the major branches of the aortic arch and is characterized by cerebral and visual symptomatology and absence of pulses. The most frequently established etiology has been found to be syphilitic aortitis and arteritis.

Pulseless disease, often referred to as "the aortic arch syndrome" or "Takayasu disease," was first described, in 1909, by Takayasu and is now accepted as a true clinical entity.

Currier, DeJong and Bole found the following symptoms in 40 patients: visual disturbance, 32; syncope and loss of consciousness attributed to turning the head upward or laterally or to a sudden change from the supine to the erect position, 29; dizziness and vertigo, 19; headache, 17; paralysis, 15; sensory changes, 10; convulsions, 9; aphasia, 8; hypersensitive carotid sinus, 10; cataracts, 15. The syncope is occasionally associated with convulsions which are apparently due to the hypersensitive carotid sinus. Shimuzu and Sano, in 1951, drew attention to the fact that an erroneous diagnosis of brain tumor may be made unless the examiner has this more rare syndrome in mind. They stated that cerebral, ear, eye, and face changes without abnormalities of the arms are prominent clinical features. However, they listed the following as common features: first, absence of

radial pulsation; second, A-V fistula in the peripapillary area, visible by fundoscopic examination; third, hypersensitive carotid sinus.

In addition to epilepsy and brain tumor, the thoracic outlet syndrome (cervical rib syndrome, scalenus anticus syndrome) must be differentiated from pulseless disease. Pain, parathesia, and trophic changes are much more common with the thoracic outlet syndrome than in pulseless disease. The aortic arch syndrome or pulseless disease runs a chronic course with variable degrees of ischemia of the central nervous system and is thought to be due to syphilis. If facilities are available, cardiac catheterization and aortography may be carried out when the thoracic outlet syndrome is suspected.

Laboratory data should include sedimentation rate, platelet count, and serum cholesterol as part of the diagnostic criteria. If possible, a Treponema immobilization test should be performed if there is a reasonable suspicion of syphilis and the usual serologic tests are negative.

Pulseless disease assumes a chronic course and occurs most commonly in young women. The symptoms of ischemia of the central nervous system may vary from a slight fainting attack to epileptiform convulsions or more serious paralysis. The most consistent laboratory finding is an increased sedimentation rate. Histologically, an arteritis of undetermined etiology with considerable inflammatory reaction is reported. Frequent giant cells are found around the great vessels with occasional thrombi which are thought to be secondary to the arteritis; thrombosis plays a secondary, but important role in the aortitis and arteritis. According to Ross and MacCousic, who extensively reviewed the etiology of the aortic arch syndrome in 1953, the most common cause of the condition was luetic aortitis and arteritis. The course of the disease extends over many years with progressive increase of symptoms. The usual cause of death is cerebral ischemia which results from occlusion of the carotid arteries. No specific treatment is known. Antibiotics, ACTH, and cortisone have been used with no effect. (Bowling, E. C., Stephens, G. L., Dein, I. O., Pulseless Disease - A Case Report: Ann. Surg., 145: 230-231, February 1957)

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#### Tinea Capitis

This study began as a survey of an Egyptian Delta village for the purpose of accurately determining the incidence of Tinea capitis in a population group representative of rural Egypt. Subsequently, a clinical-laboratory study was initiated in a university hospital to identify the pathogenic fungi, define the natural history of Tinea capitis (Egypt) and attempt the establishment of guidelines for the public health management of this distressing disease. An experience of 1000 cases of Tinea capitis was reported.



The initial survey of the incidence of *T. capitis* was integrated with a World Health Organization antituberculosis program in a village population of 5000. Every third individual was examined for fungus disease within the limits imposed by the local cultural mores. Examination of the scalp, face, neck, lower arms, hands, nails, lower legs, and feet was routinely accomplished.

*Tinea capitis* (Egypt) is a chronic, endemic, prepuberty disease which reaches a peak in both males and females at the age of 5 years. *T. violaceum* and *M. canis* infections will spontaneously clear either before, or at the time, of puberty. *Trichophyton schoenleini* infections may persist beyond puberty. Extreme clinical variations in the natural history of these infections are common. These variations relate to the rate of growth of the initial lesion, the appearance of secondary lesions, immunity zones, spontaneous cure at puberty, and the response of the infection to nonspecific therapy. No attempt has been made to assess the importance of these factors or their possible significance in the management of *Tinea Capitis*. Nine out of ten children living under identical environmental conditions are immune to this disease. Immunity to *capitis* infections may be a function of local resistance and this local resistance in turn a function of physical factors subject to public health control.

The prevention of *Tinea capitis* in the Middle East is a feasible public health objective. The desirability of a preventive attack is obvious in view of the socio-economic problems inherent in the organization and maintenance of an adequate treatment program. Reinfection and treatment failure are frequent and the necessity of repeated follow-up examinations adds a significant burden to the therapeutic program. Within the preschool groups, prevention is the responsibility of the family. Upon admission to the school system, preventive action becomes, in addition, a proper function of the social and health services.

Recent studies on the epidemiology of the dermatophytes and observations on the clinical course of *Tinea capitis* in the Middle East clearly indicate factors in the natural history of this disease which are susceptible to preventive interference. Baer et al., were unable to cause fungus disease of the feet by a 30-minute exposure in foot bathwater heavily contaminated with dermatophytes. They conclude that the role of these fungi in causing disease only when favorable local conditions prevail ("lowered resistance") may be likened to that played by *Mycobacterium tuberculosis* or *Micrococcus pyogenes*. It would appear that public health and individual measures for prevention of active attacks of fungus disease must for the present be based on the maintenance and increase of local resistance to infection. The feet, inguinal folds, and axillae are fungus disease prone. In common, they are seldom exposed to sunlight and are subject to sweating, friction, and maceration. These factors in turn combine to create a continuing state of reduced local resistance. In the Mariana Islands, barefoot population groups are

significantly free of *Tinea pedis*. Exposure of the feet of military personnel at Saipan to direct sunlight as a means of increasing local resistance dramatically and effectively reduced the incidence of fungus disease.

The scalp, with its mat of hair, retained sweat, epidermal scales, dust, and bacteria, presents an ideal substrate of minimal local resistance for the growth of fungi. In addition, the wearing of a tight fitting skull cap or turban prevents exposure to sunlight, restricts evaporation, and retains the products of bacterial decomposition.

The specific action of sunlight in increasing local resistance to fungus infection is amply demonstrated in the following clinical situations: (a) fungus infection of the glabrous areas exposed to sunlight is extremely rare; (b) extension of *Tinea capitis* infections to the adjacent exposed skin is likewise rare; (c) infection of the fingers and nails from repeated scratching of a pruritic *Tinea capitis* has not been seen in a series of over 1100 patients; and (d) extension of disease on a clipped scalp is less rapid than in the presence of long hair.

A major reduction in the incidence of prepuberty *Tinea capitis* can be expected by (a) washing the scalp, (b) clipping the hair, and (c) increasing the local resistance by exposure of the clipped scalp to direct sunlight. (Galloway, C. B., Soliman, A. A., Clinical Laboratory Study of 1000 Cases (Egypt): Naval Medical Research Unit No. 3, Cairo, Egypt. Research Report NM 007 082.35.01)

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### Dental Research

The following is a resume with plans for the future of the recent dental research studies undertaken at the Dental Research Facility, Administrative Command, U. S. Naval Training Center, Great Lakes, Ill.:

#### I. Saliva Chemical Studies

1. Parotid Chloride. Because chloride ion is necessary for the activation of salivary amylase and recent studies with whole saliva have demonstrated a relationship between chloride levels and caries activity, the dental research team at Great Lakes has undertaken studies on parotid salivary chloride levels and caries activity. Using potentiometric titration methods, a significant difference in the mean parotid chloride levels between 50 caries rampant and 20 caries free persons has been found. This study will continue and more chloride determinations will be made on caries free persons. In this manner, it will be possible to determine whether individual overlapping would obviate the use of parotid chloride levels for the estimation of caries activity.



## 2. The Rate of Flow, pH and Titratable Alkalinity of Parotid Saliva.

These variables have been measured in the parotid salivas of 50 caries rampant and 30 caries free persons under standard conditions. Contrary to previous reports on whole saliva, no differences have been found in the rates of flow and titratable alkalinity of the two groups. The mean pH values have been remarkably similar in both groups. The average rate of secretion for the parotid gland has been established, and the simultaneous rates of secretion of both parotid glands in each individual have been found to be similar. It has also been noted that pH, titratable alkalinity and chloride concentration vary directly in a given individual with the rate of flow of parotid saliva. The study of sodium, potassium, and calcium levels of parotid saliva is planned.

## 3. Enzymes.

a. Acid Phosphatase. This enzyme found in pure uncontaminated parotid saliva has been shown chemically to resemble closely the acid phosphatase found in tissue homogenates of the prostate gland and that of blood serum of patients with advanced carcinoma of the prostate gland. Parotid saliva acid phosphatase levels in 25 untreated cases of carcinoma of the prostate gland were significantly elevated. Nineteen of these cases were in early stages of the disease. Present statistical trends indicate the possible use of parotid acid phosphatase levels as an early detectant of carcinoma of the prostate gland.

b. Aldolase. This enzyme—involved in anaerobic glycolysis—is present in both whole and parotid saliva. Characterization of both enzymes shows that in whole saliva they are principally of bacterial and/or yeast origin while the parotid enzyme is exclusively of parotid gland cellular origin. Routine methods for quantitation of aldolase in whole saliva have been developed. Studies are in progress in order to determine the value of aldolase activity in saliva as an indication of the rate of glucose degradation in the oral environment.

c. Lysozyme. Submaxillary and sublingual saliva have relative high titers of lysozyme. On the other hand, the mucopolysaccharide component of submaxillo-lingual saliva competes selectively with common substrates for active sites on the lysozyme molecule secreted by the parotid gland, thus inhibiting the activity of the parotid lysozyme in a linear fashion. Because the submaxillary and sublingual glands are rich in this enzyme, efforts are being directed towards isolation and purification of human salivary lysozyme. These procedures will be carried out by column electrophoresis and by ion exchange chromatography.

## 4. Amino Acids and Complex Protein Molecules

a. Amino Acids. Standards for all amino acids are being prepared by partition chromatography and filter paper electrophoresis in preparation to determine the molecular make-up of isolated proteins of pure salivary gland secretions.

b. Complex Protein Molecules. Concerted effort is being made to separate the pure salivary secretion into its protein components by zone (anticonvection) electrophoresis on filter paper and starch gels. Similar efforts will be made to determine blood serum components in normal and diseased persons with various degrees of periodontal disease.

c. Total Parotid Proteins. The Micro-Kjeldahl technique will be used for the determination of total protein and nonprotein nitrogen in parotid saliva. These analyses will be correlated with caries activity.

d. Pre-Natal Sex Determinations in Parotid Saliva. Work is in progress on adapting the Rapp salivary pre-natal sex test to parotid secretions. The spectrophotometer will be used to determine color reactions. The use of parotid secretions rather than whole saliva may increase the sensitivity of the test.

e. Volatile Amines and Periodontal Disease. Other workers have demonstrated increased methyl amine, ethyl amine, skatole and indole in the whole salivas of individuals with periodontal disease. These compounds are produced by a nonoxidative decarboxylation of certain amino acids by bacteria. These products of putrefaction are definitely irritating to the gingivae when applied topically. Therefore, a study on the relationship of the volatile amine content in whole saliva to periodontal disease is planned.

## II. Studies on the Bacteriology of the Oral Cavity

1. Micrococcus pyogenes var. aureus. This microorganism was isolated from the saliva of normal, vincent's, gingivitis, and periodontitis patients. This organism was found in approximately 40% of all patients. Penicillin resistant strains were equally distributed between the normal and periodontal patients. Bacteriophage studies are being performed on micrococci in order to determine the possibility of determining penicillin resistant strains.

2. Lactobacilli Counts and Mouth Rehabilitation. Salivary Lactobacilli counts have been performed on persons with rampant caries in the following categories:

a. Patients who have had all carious lesions excavated and filled with zinc oxide and eugenol cement.

b. Persons who have had permanent restorations—these have been followed for over a year.

c. Persons who have had full mouth extractions and the insertion of full dentures.

In the majority of cases, lactobacilli counts dropped to zero after the carious lesions were removed and the counts remained at zero until new lesions were formed. When all teeth were extracted, the counts were reduced to zero and remained at this level until about 3 months after the insertion of artificial dentures. At this time, the counts approached the pre-count levels. Studies are continuing along these lines.



3. Enterococci. Orland reported the production of caries in germ-free animals with Enterococci. An attempt was, therefore, made to isolate enterococci in the saliva of humans with and without dental caries. Enterococci could be isolated only rarely from all patients and was, thus, considered of no importance in human caries.

4. C-Reactive Protein. An attempt was made to determine C-reactive protein in parotid saliva as a means of detecting periodontal disease. This attempt gave negative results, but the study will continue using blood in lieu of parotid saliva.

5. The Effect of a Mouthwash Containing a Competitive Inhibitor for Thiamine on Oral Lactobacilli. The effect of a mouthwash containing 1, 3 bis-ethylhexyl, 5 methyl, 5 amino, 5 hydropyrimidine on salivary lactobacilli counts is being tested.

6. The Properdin System. Normal human and mammalian sera contain a protein in the euglobulin fraction called properdin which is a constituent of the natural defense mechanism of the blood. It differs from an antibody in its apparent lack of serological specificity. A study of the properdin system and its relationship to immunity and periodontal disease has been initiated.

### III. Studies on the Dentobacterial Plaque

1. The Effect of Saliva on Acid Production in the Dental Plaque. In this study, the role of saliva on the production of acid in dental plaque following the ingestion of refined carbohydrates is being defined more accurately. Plaque pH determinations and simultaneous lactate analyses are carried out on individuals who have had their saliva restricted by means of parotid caps and strong suction on the floor of the mouth. Plaque pH determinations in 35 caries rampant and caries free subjects show that higher continuous acidities occur when saliva is prevented from washing over the plaques on teeth after a sucrose mouth spray. This study will continue until 100 cases are studied and all plaque is analyzed for lactate content.

2. The Correlation of Lactobacilli Counts with the pH of Plaque Formed on Artificial Dentures. pH values will be determined on the dental plaque which forms in individuals with full upper and lower dentures. Thus, it will be possible to detect changes in plaque acidities concomitant with the appearance of salivary lactobacilli which occurs shortly after the insertion of artificial dentures.

### IV. Clinical Comparisons of Analgesics in Dentistry

The subjective method of testing analgesic agents (by questionnaires) after simple dental extractions was applied to 1953 patients. Analgesic tablets tested included Aspirin, APC, Apromal, Tabcin, and a Placebo. It is interesting to note that 35% of the patients tested did not have postextraction

pain and did not find it necessary to use the tablets. Placebo tablets relieved pain in a high percentage of cases. Aspirin appeared as effective as APC. However, it was impossible to validate the subjective method of testing because of the relatively small number of questionnaires returned in the various analgesic groups.

#### V. P-M-A Indexing Studies of the Gingivae

The effects of a voluntary (noncontrolled) program of toothbrushing were evaluated in a group of 154 Naval Inductees (males, 17 to 22 years of age). Each man was given a toothbrush and dentifrice and instructed to brush his teeth on arising and after each meal. No attempt was made to control the brushing. The effects were studied by means of a careful clinical evaluation using the P-M-A index supplemented by standardized color photographs taken at 0, 10, and 15 weeks. Only a small percentage of the subjects showed improved cleanliness of the enamel and gingivae. A small percentage of the cases with improved oral hygiene showed improved gingivae. It is felt that good color photographs taken before and after any therapeutic procedure are essential to the accurate and objective evaluation of the effects of such procedures.

#### VI. Pulp Studies

1. Clinical Evaluation. To date, vital pulpotomies, using various medicaments, have been performed on over 300 caries exposed human teeth. About 90% of all pulpotomies could be considered clinically successful and these findings compare favorably with the results of European workers. It has been a common practice of clinicians to cap only pin point exposures and extract large exposures or those surrounded by extensive caries. However, it appears that the liability of clinical success is no more reduced after pulpotomy than after simple pulp capping.

2. Histologic Studies. Histologic examination of exposed pulps under calcium hydroxide preparations showed the highest incidence of bridging, the lowest incidence of internal resorption and the least amount of inflammation; however, the histologic picture was not as encouraging as the clinical results. Antibiotics did not appear to be beneficial to vital pulp tissue. There did not seem to be any definite relationship between clinical symptomatology of the pulp and the histologic appearance.

It has been found that 10% of randomly selected caries exposed teeth showed histologic evidence of necrotic pulps. The number of necrotic pulps did not increase after pulpotomy procedures and only 10% of the pulpotomy cases studied exhibited necrotic pulps. Therefore, it appears that pulps do not become necrotic after pulpotomy, but were already in that condition at the time of selection.



Further studies with silver nitrate have demonstrated that silver nitrate eventually penetrates to the pulp after being placed in cavities. Silver particles were seen within degenerating odontoblasts and other pulpal cells and were found deposited around capillaries.

The histologic study of all teeth will continue and specimens are being collected and studied in order to evaluate indirect pulp capping procedures with calcium hydroxide and zinc oxide and eugenol.

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From the Note Book

1. Dr. Dwight H. Murray, President, American Medical Association, and Dr. Leo H. Bartemeier, Medical Director, Seton Institute, Baltimore, Md., departed from San Francisco, Calif., on March 2, 1957, for an extensive visit of Naval Medical facilities in the Pacific and Far East. The tour, by invitation of Rear Admiral Bartholomew W. Hogan, Surgeon General of the Navy, is designed to make national and internationally-known civilian medical educators and specialists aware of the high standards of medical care rendered by the Navy Medical Department; to assist Navy Medical officers in keeping abreast of recent advances in medicine, and for morale purposes. (TIO, BuMed)
2. Rear Admiral Bartholomew W. Hogan MC USN, the Surgeon General, participated in Convocation ceremonies at the New York University Bellevue Medical Center, New York, N. Y., on March 4 - 5, 1957, in celebration of the Diamond Jubilee of the University Hospital. (TIO, BuMed)
3. The Surgeon General recently sent a praiseworthy letter to Commander Frank Spano, MC USNR (Ret), in appreciation of his handsome contribution to the Navy Medical Department Historical Fund. Dr. Spano's continuing interest in the affairs of the Medical Department is most noteworthy.
4. Captain T.D. Boaz MC USN has been designated by the Surgeon General to represent the Navy Medical Department at the Annual Meeting of the U. S. - Mexico Border Health Association which is to be held at San Antonio, Texas, April 9 - 12, 1957. (TIO, BuMed)
5. The Board of Directors of the Navy Mutual Aid Association, on 15 February 1957, announced the election of Admiral Arleigh Burke USN as President. Other officers elected by the membership were Rear Admiral A.H. Van Keurin USN (Ret), First Vice President, Rear Admiral Frank Baldwin SC USN (Ret) Second Vice President, and Major General R.E. Hogaboom USMC, Third Vice President. A total of 3000 new members joined the

Association during 1956 which made it the most successful year in the Association's 78-year history. The Board announced insurance in force in excess of \$127,000,000 and total assets of more than \$32,000,000.

6. Chlorpromazine was administered for a period of 6 - 8 months to 153 mentally defective, pre-psychotic, epileptic or spastic children. Results were rated excellent in 80 cases (52%); good in 39 (25%), fair in 18 (12%) and poor in 16 (10%). Hostility, hypochondria, fear, and withdrawal were greatly reduced or eliminated in individual patients and general disturbances of ward routine by violence or apprehension were eliminated. Destruction of property was reduced. (Am. J. Med.Sci., February 1957; C.H. Carter, M.D., M.C. Maley, M.D.)
7. Hypertension is due, at least in part, to specific defects in renaltubular function and can be classified among such other metabolic diseases as nephrogenic diabetes insipidus, renal glycosuria, idiopathic hypoproteinemia, primary aminoaciduria, idiopathic hypercalcuria, renal hypokalemia, chloride acidosis, pseudohypoparathyroidism, vitamin D-resistant rickets and the deToni - Fanconi syndrome. (Arch. Int. Med., February 1957; T. Findley, M.D.)
8. Arteriosclerotic aneurysms occur in degenerative disease of the thoracic aorta and are a malady of the elderly. These aneurysms may be asymptomatic, but often there is a history of hypertension. When symptoms occur, the situation is ominous. (Ann. Int. Med., February 1957; I.Steinberg, M.D.)
9. A series of 50 eyes in 27 patients with trachoma were treated by conjunctival injections of chloramphenicol, with use of the standard vials supplied for intramuscular injection. In 80% of the eyes, there was some improvement and in 44% of these, improvement was spectacular. (Arch. Ophth., February 1957; R. W. B. Holland, M.B., Pakistan)
10. The stingray is a venomous fish capable of inflicting painful wounds. The most effective method of alleviating the pain and preventing the deleterious cardiovascular effects of the venom is to irrigate the wound immediately and thoroughly with the cold salt water at hand, immerse the involved extremity in hot water for 30 minutes to an hour and then apply a sterile, antiseptic dressing. (F.E. Russell, R.D. Lewis, Venoms, American Association for the Advancement of Science)
11. Based on experience with 102 cases of reflux esophagitis and predicated on the etiologic factors, as understood today, a program of management is discussed in Am. J. Surg., February 1957; H. W. Hale, Jr., M.D., and T.D. Rapanas, M.D.



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**DENTAL****SECTION**

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DOD Committee Visits Naval Dental School

The Department of Defense Dental Advisory Committee visited the U S. Naval Dental School, National Naval Medical Center, Bethesda, Md., on 15 March 1957. The Committee met with staff Dental officers and discussed dental problems of mutual interest to the several branches of the Armed Services.

The Department of Defense Dental Advisory Committee was appointed on 25 November, 1955, to advise and assist Dr. Frank B. Berry, Assistant Secretary of Defense (Health and Medical), in the development and implementation of policies, plans, and programs required to provide dental care and services for the Armed Forces.

Members of the Dental Advisory Committee who accompanied the Assistant Secretary of Defense (Health and Medical) on this visit were:

Dr. Thomas B. Fox	Dr. Francis J. Reichmann
Dr. John C. Brauer	Rear Admiral R. W. Malone DC USN
Dr. Daniel F. Lynch	Brig. General M. E. Kennebeck USAF (DC)
	Maj. General J. M. Epperly (DC) USA
Invited guest: Dr. William R. Alstadt	
	President-Elect, American Dental Association

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Correspondence Course on Dental Administration

A new correspondence course entitled Dental Department Administration, NavPers 10736, is available for officers of the Navy Dental Corps. This twelve-assignment course has been prepared by the U. S. Naval Dental School under the supervision of the Dental Division of the Bureau of Medicine and Surgery. The course meets an urgent need of the Dental officer to familiarize himself with naval organization and administrative functions which have been effected within recent years in dental facilities ashore and afloat.

Each chapter serves as an assignment of approximately one hundred objective questions. In addition to setting forth the principles of organization and management, this course discusses dental services for various categories of personnel, administration of dental records, office management, fiscal and property management, and dental facility planning.

Requests for enrollment in Dental Department Administration should be submitted on NavPers Form 992, Application for Enrollment in Officer Correspondence Course, to the Commanding Officer, Code 5, U. S. Naval Dental School, National Naval Medical Center, Bethesda 14, Md., via the chain of command. These forms can be obtained from commanding officers, district commandants, and most naval commands overseas. Reserve officers not on active duty may submit NavPers 992 via the commandant of the appropriate naval district or the commanding officer of his Reserve unit. The course is evaluated at 24 Naval Reserve promotion and nondisability retirement points.

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#### Captain Colby Is Awarded "Legion of Merit"

At ceremonies held at the U. S. Naval Dental School, NNMCC, Bethesda, Md., March 15, 1957, the "Legion of Merit" was presented to Captain Robert A. Colby, DC USN, for "exceptionally meritorious conduct—in addition to his primary duties—in planning preparing, writing, and editing a book entitled Color Atlas of Oral Pathology which is considered by numerous reviewers to be a work of great scientific and practical value and an invaluable contribution to the field of dentistry . . . ." This presentation was made by Rear Admiral Bartholomew W. Hogan, Surgeon General of the Navy.

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#### Dental Interns for Fiscal Year 1958

Ensigns 1995/Dental who are scheduled to be graduated from dental school in June of 1957 have been selected for participation in the Navy Dental Intern Program for the period of 1 July 1957 to 30 June 1958. These Interns will be appointed as Regular Navy Dental officers upon their acceptance of this year of training. They are:

Barlow, Doil Earl  
Cross, George Barton  
Dodds, Ronald Neil  
D'Onofrio, Albert Marshall  
Forte, John Theodore  
Gensior, Arthur Marvin

University of Nebraska  
University of Oregon  
Creighton University  
Georgetown University  
Temple University  
University of Illinois



Giles, Norman Brown  
 Grady, Charles Joseph, Jr.  
 Grove, David Malley  
 Lolla, Richard Vincent  
 Marino, Louis John  
 Mayberry, Richard Miles  
 McAndrew, James R.  
 McGary, Charles William  
 Messer, Eugene Joseph  
 Mielke, Dean Talbot  
 Stump, Thomas Eugene  
 Tibbetts, Van Roger

Northwestern University  
 Tufts College  
 College of Physicians and Surgeons  
 University of Pennsylvania  
 Georgetown University  
 University of Pittsburgh  
 Loyola University (New Orleans)  
 University of Michigan  
 University of Maryland  
 Marquette University  
 Temple University  
 University of Southern California

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#### BuMed Notice 1520

BuMed Notice 1520 of 14 February 1957 - Report on Civilian Refresher, Postgraduate, or Graduate Training; discontinuance of. Purpose: To advise that, effective immediately, the Report on Civilian Refresher, Postgraduate, or Graduate Training shall no longer be submitted to the Bureau of Medicine and Surgery by Dental officers who have completed such training.

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## RESERVE SECTION

### Correspondence Courses Administered by Bureau of Naval Personnel

Because correspondence courses are necessary to successfully effect the promotion of Naval Reserve officers on inactive duty, the following basic and general courses, which are available to all eligible Medical Department officers and certain enlisted personnel, are published for general information to provide assistance in fulfilling professional qualifications for promotion as required. The successful completion of a correspondence course is not only essential to promotion, but also provides a means of accumulating retirement point credits.

These courses are in addition to the Medical Department Correspondence Courses published from time to time in this Section of the News Letter. Until further notice, specific courses for promotion of inactive Reserve

Medical Department officers are not required. Eligible officers may enroll in any BuMed or below-listed BuPers course and receive proper credit for promotion.

<u>Course</u>	<u>NavPers Number</u>	<u>Assign- ments</u>	<u>Retirement and/or Promotion Points</u>
Administration of Officer's Messes	10970	6	12
Appropriation and Cost Accounting	10984	8	16
Claims	10727	3	6
Combat Information Center	10952	12	24
Education and Training - Part I	10965-1	7	14
Education and Training - Part II	10966	5	10
* Foundations of National Power	10770-A1	12	24
General Communications	10916-A	7	14
* General Aerology	10954-A	6	12
Industrial Management	10947	10	20
* International Law	10717-A	12	24
Investigations	10726	2	4
Leadership	10903	5	10
Logistics	10902	6	12
Military Government	10718	7	7
Military Justice in the Navy	10993	12	24
Naval Arctic Operations	10946	5	10
* Naval Orientation	10900-1	11	24
Naval Public Information	10720-1	6	12
Navy Real Estate Law	10989	6	12
Navy Regulations	10740-A	12	24
Navy Travel	10977	2	5
Nucleonics for the Navy	10901	8	24
Organization for National Security	10721	5	10
Personnel Administration	10968	6	12
Photography	10957	8	16
Photographic Interpretation	10958-A	9	18
Radiological Defense	10771	7	14
* Security of Classified Matter	10975-A1	3	6
Uniform Code of Military Justice	10971	1	4
Water Supply and Sanitation	10750	6	12
Welfare and Recreation	10969	12	24

\* Designates a revised course which has had NavPers number or letter changes to indicate revision. Officers who complete this course, even



though they completed course under old NavPers number, will receive point credit indicated above (with the exception of Naval Orientation, NavPers 10900-1. Officers who previously completed the NavPers 10900 course, will receive one-half credit, 12 points, for completion of the NavPers 10900-1 course).

Note: Material for many courses is in short supply. Therefore, all applications submitted should list a second choice. Requests for enrollment for the above should be addressed to the U.S. Naval Correspondence Course Center, Building RF, U.S. Naval Base, Brooklyn 1, N.Y. Use NavPers 992 (Revised 10/54 or later) for officers and NavPers 580 for enlisted personnel. Applications should be submitted as follows: (a) If you are a member of, or associated with, a pay unit, forward via your unit commanding officer and such other official channels as may be locally prescribed. (b) If you are not a member of, or associated with, a pay unit, forward via your district commandant.

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#### HC Division Activated in Twelfth Naval District

Hospital Corps Division 12-1, located at the U.S. Naval Hospital, Oakland, Calif., was activated on 1 February 1957, with membership consisting of 4 officers and 44 enlisted hospital corpsmen.

Interested and eligible Reserve Medical Department personnel residing in the San Francisco area who desire to affiliate with this new pay unit should communicate with the Reserve Medical Program Officer of the Twelfth Naval District.

Authorization for the establishment and activation of Hospital Corps Divisions in all continental Naval Districts is contained in BuPers Instruction 3500.16, dated 12 September 1956. This new program replaces the one with designated Surface Divisions which formerly trained Reserve Hospital Corpsmen. This affords the interested and eligible Medical Department officer and enlisted Reservist (less Dental) an excellent opportunity to participate in the Reserve program in a pay status and deserves your active support.

Any member of the Reserve Medical Department who desires to affiliate with, or to activate, a Hospital Corps Division should write or visit the Medical Reserve Program Officer of his Naval District.

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#### Reserve Dental Company Activated

Naval Reserve Dental Company 6-15 was commissioned at the University of Alabama, Birmingham, on March 5, 1957. This is the fifteenth

Ensign (1995) Dental Company in the United States and the fourth Ensign (1995) Dental Company in the Sixth Naval District, the others being at the University of Tennessee, Emory University, and the University of North Carolina.

The commissioning ceremony was presided over by Captain I. Edward Brenner DC USNR, District Reserve Dental Program Officer, Sixth Naval District. Dean J. F. Volker of the University of Alabama Dental School; Captain Dale L. McKee DC USN, District Dental Officer, Sixth Naval District; and Captain Collister M. Wheeler DC USNR, Head, Dental Reserve Branch, Dental Division, Bureau of Medicine and Surgery, made appropriate remarks at the commissioning.

In the past 2 and 1/2 years, the number of Reserve Dental Companies has increased from seven to eleven and the participants from 59 to 155 in the Sixth Naval District.

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## PREVENTIVE MEDICINE SECTION

### Importance of Chest X-Rays in Total Radiation Exposure

The report of a survey by six committees of the National Academy of Sciences on radiation is of particular concern to tuberculosis workers and physicians because of the emphasis which has been put upon the chest x-ray.

Primarily, the survey was made to evaluate the effect on the population of the testing of nuclear weapons and an estimate of future radiation likely to occur from the extension of peaceful uses of atomic energy. The use of radiation in medical practice inevitably came into the discussion. The point was made that all radiation is harmful from a genetic point of view, inevitably producing a number of injuries to the reproductive cells which in turn result in certain mutations. The effect is cumulative and such injury may not show up for generations in the future. If such radiation is not controlled carefully, the inevitable effect—it is said—will be an increase in the death rate, a decrease in the birth rate, and ultimate eradication of the human species.



From a long-range genetic standpoint, a small exposure to radiation of the general population is just as bad as a high degree of radiation of a relatively small group of people. The important thing is the radiation of the reproductive organs (ordinarily referred to as the gonads). The local radiation of a part of the body remote from the gonadal region, such as a dental x-ray, will result in a certain amount of radiation of the gonads themselves. The report states that the average dental x-ray results in a direct exposure of the face of about 5 r ( $r$ ="roentgen", a unit of radiation) and of this exposure, .005 r reach the gonads.

There is some radiation that one can do nothing about; namely, the radiation from radioactive minerals and cosmic rays from outer space. With this so-called background radiation in mind, the scientists suggest that, in addition, man-made radiation of the general population should be kept below a total of 10 r's from conception to age 30 so far as radiation of the gonads is concerned. Those in occupations which necessitate greater exposure than this should keep such exposure below 50 r's during the first 30 years of life, and not exceed another 50 r's between the ages of 30 and 40. (Nine-tenths of children are born to parents under 40 years of age. Radiation of persons beyond the child-bearing age is obviously less serious).

From the standpoint of mass use of chest x-rays for screening to detect the presence of active tuberculosis, the 10 r maximum limit obviously must be used rather than the 50 r limit. Scientists point out that even a 10 r general exposure from man-made sources over the first 30 years of life will exert a certain toll in terms of hereditary defects, but apparently it is felt that this exposure will not be serious and is not unreasonable.

One can assume then that an individual has in the bank at conception 10 r's of x-rays or gamma rays. The object is to try to spend as little of these 10 r's as possible, doing so only when the benefits clearly outweigh possible genetic injury which may result. This balancing of the assets and debits of a given x-ray exposure is an extremely difficult and rather nebulous thing, but it does make it clear that any x-ray program that yields no important practical results (such as using x-rays to check on the fitting of shoes) should be stopped.

To assist in the evaluation of a chest x-ray program, it is first necessary to know how much radiation of gonads results from a chest x-ray. It is evident that scientists do not feel that such exposure is entirely negligible.

A study at the Brookhaven National Laboratory shows the total dose received as a result of x-raying various anatomical structures under varying conditions. According to the Brookhaven figures, the exposure incident to the conventional chest x-ray is 0.05 r. This is the total dosage received by the part being x-rayed. It is not the dosage received by the gonads through stray radiation and scattering inside the body. From the genetic point of view, the important thing is not the total dosage, but how much reaches the gonads.

Dr. Edward Chamberlain, Professor of Radiology, Temple University Medical School, Philadelphia, presented certain data at the last meeting of the Subcommittee on Tuberculosis of the National Research Council concerning the amount and seriousness of gonadal radiation resulting from various chest x-ray procedures. Dr. Chamberlain's calculations are as follows:

Approximate Radiation Received by the Gonads from a Single Exposure:

1. Conventional chest film (14- x 17-inch) ..... 0.00025 r
2. Regular photofluorograph..... 0.005 r
3. Photofluorograph using the new mirror optic system.... 0.0015 r

On the basis of dosages given by the Brookhaven National Laboratory, the radiation reaching the gonads from a conventional chest x-ray or regular photofluorograph is apparently 1/200th of the total dosage received.

It is obvious from these figures that if the 10 r gonadal radiation were to be used up entirely by photofluorographs of the usual type, this would take some 2000 such photofluorographic chest films during the first 30 years of life. Even if individuals followed the usual advice of an annual chest x-ray from the age of 15 onward, this would mean only 15 photofluorographs by age 30. Fifteen annual PF's would use up less than 1% of 10 r's (actually .075 r) and would seem to make it clear that there is a large safety factor even in the use of the regular photofluorographs.

According to data, the highest exposure chest x-ray gives no more gonadal radiation than the dental x-ray exposure. Fluoroscopy itself, of course, is quite another matter and gives a very high dose.

Conclusions

1. Fluoroscopy should not be used for screening purposes. (It may be necessary for diagnostic purposes.)
2. Any x-ray program yielding data of no significance should be discontinued. (A given type of x-ray program may be justified in a certain population group and unjustified in another.)
3. In very few communities, if any, in the United States would routine chest x-ray screening of the general population under the age of 15 be justified.
4. From the genetic standpoint, chest x-rays of older people who have completed their families are of no importance, and furthermore, this is the group with the higher rates of prevalence of tuberculosis.
5. The standard 14- x 17-inch chest x-ray film gives such a low dosage of gonadal radiation that it is essentially negligible at any age.
6. The use of the new photofluorograph camera using the mirror type of optics results in less than one-third as much gonadal radiation as the regular photofluorographs.



7. Even the regular photofluorograph causes such a low dose of gonadal radiation that its use for tuberculosis screening purposes in individuals who have not completed their families is justified if these individuals are in population groups with a considerable prevalence of tuberculosis.

8. Determination of what groups should be continued to be screened by chest x-rays must be made locally upon the advice of the physicians guiding the program, such as the Trudeau Society or a medical advisory committee.

(Statement by Perkins, J. E., Importance of Chest X-Rays in Total Radiation Exposure: Tuberculosis Abstracts, National Tuberculosis Association, XXX: 1, January 1957)

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#### Practical Aspects of a Hearing Conservation Program

In the study of noise and hearing as well as in other fields of scientific research, there is often a large area of information which remains undefined and inexact between, on the one hand, the purely research phase of the work, and, on the other, the purely applied phase. The problem of hearing conservation is no exception. Practical questions, such as "what is a dangerous level of noise exposure?" and "what type of ear protectors are the best?" are frequently presented to the researcher and are difficult to answer without qualification. In this short discussion, an attempt is made to give a partial view of how this gap may be bridged and how the benefits of scientific research on noise and hearing can be brought out of the laboratory and back to the industrial environment where a real saving in human hearing can be accomplished.

A noise research and hearing conservation program was initiated at Long Beach Naval Shipyard by the Medical Department of the Shipyard and executed through the cooperation of the Subcommittee on Noise in Industry of the American Academy of Ophthalmology and Otolaryngology. Individually, the immediate interests of the Navy Medical Department were primarily the conservation of hearing at the shipyard itself while the Subcommittee sought field and laboratory data in order to study specific questions regarding industrial noise exposures, such as audiometric procedures, frequency analysis of industrial noises, and permanency of hearing losses, et cetera. These data would be of value in hearing conservation throughout industry.

An intensive field and laboratory research program was begun and continued at full operation for a period of 6 months during which time, approximately 600 field audiograms were taken on employees brought directly from a noisy industrial environment to a sound-insulated booth near the work location where pure tone audiograms were taken. Tape recordings of

industrial noise, noise frequency analysis, and sound levels were among other field data gathered.

In field observation and questioning of test subjects, it was evident that, although some of the approximately 2500 employees exposed to high noise intensity levels were conscientious in wearing ear protection, a large group worked under the same conditions without ear protection.

Preliminary analysis of data showed significant hearing losses in older age groups. Specifically, it was found that the hearing loss of welders, boilermakers, and foundrymen in the age group above 30 years was greater than would be expected from the average population indicating that these employees had been exposed to noise which may have produced a hearing loss. To conserve the hearing of such employees, it was necessary to institute the wearing of ear protection on a more complete scale and it was decided that the best way to do this was through an educational program.

The educational program consisted of two parts: First, a motion picture on noise and hearing prepared by the Subcommittee was shown, followed by a lecture accompanied by recorded sound demonstrations of high intensity noise gathered in field studies. At the close of the meeting of 30 to 40 minutes, a short discussion on ear plugs was given and a set of wax-impregnated cotton plugs issued to each man with the explanation that either this type or a permanent rubber type was available. Approximately fifteen meetings were held with a total attendance of about 1500 persons. All were exposed to high intensity level noise in the course of their duties. Master mechanics and foremen of the respective shops also attended. A check of issues of ear plugs showed a marked increase in demand for plugs with some preference for the new soft rubber V51R plug. The interest shown by employees has been sustained at a high level over the 6-months period since the educational program was completed as shown by the fact that 50 to 100 permanent type plugs are fitted in the dispensary each month.

Previously, the policy was to issue ear plugs along with other protective equipment at the Safety Equipment Issue Department. The employee fitted his own ear with the size he believed most comfortable. For several reasons, this practice was undesirable and a procedure was instituted for fitting all ear plugs at the dispensary by an audiometrist under the supervision of a physician.

All employees exposed to high intensity level noises are given a pre-employment audiogram along with their regular physical examination. It is particularly important that these audiograms be reliable and performed in an approved manner because, in addition to other values, they may constitute important evidence in litigation for loss of hearing compensation. Although personal factors in taking an audiogram may eventually be eliminated, these factors still control to a large extent the accuracy of an audiogram which makes it imperative that a person skilled in audiometry prepare the audiogram. A testing room which has a constant low level of noise is also



essential for reliable audiometry. Simply locating a quiet room is, in general, an inadequate procedure because an extraneous noise, such as a passing automobile, may invalidate at least part of the data and, in defending the accuracy of an audiogram, this is certainly a vulnerable factor. For this reason and others, a prefabricated sound-insulated booth was installed in the Medical Department and training in audiometry for Medical Department personnel was instituted. This has not only permitted accurate audiometry, but it has brought a favorable response from employees.

Arbitrarily, if an over all noise intensity of 90 decibels is considered sufficient to produce hearing loss in continued personal exposures, it is certain that individuals will vary considerably in the degree of hearing loss produced from this exposure with some showing no loss while others show readily measured losses. Another factor to be considered is that noises vary widely in frequency and it is believed that losses produced in individuals will also vary with the spectrum of the noise exposure although the over all intensity remains the same. For these reasons, in addition to preemployment audiograms, it is necessary to perform periodic audiograms to locate ears with particular susceptibility to noise and to prevent further loss of hearing. In performing periodic audiometric examinations on individuals brought from noisy environments, it is important to note whether any exposure has occurred before reporting for the audiogram because temporary hearing losses from exposure may produce an erroneous audiogram.

Preemployment audiograms, therefore, become valuable in establishing normal hearing because no recent exposure to high intensity level noise is probable.

Before the hearing conservation program had been initiated at Long Beach, a large group of employees had been employed without preemployment audiograms and it was necessary to obtain these audiograms because approximately one-third of all employees are exposed to potentially damaging noise levels at least part of the working day. To call all employees to the dispensary for audiograms would be an expensive process and it was decided that since all employees visit the dispensary at least once a year, an opportune time to obtain audiograms would be at the time of the visit to the dispensary for occupational or personal illness, accident, or for annual chest x-ray. This program is currently in operation and appears to be working satisfactorily. To perform annual audiograms on all of the 2500 exposed personnel would require a rate of approximately 45 per week. Currently, approximately 64 audiograms are performed per week of which 15 are preemployment.

Reaction of employees to the hearing conservation program has been encouraging. At the beginning of the program, many patients expressed apprehensions concerning the results of the audiograms. They thought that a proven lack of hearing might result in the loss of their position or endanger their chances of promotion. The older employees stated that they did not object to it. A few ridiculed the use of ear plugs and expressed an objection that they would be unable to hear spoken voices when using ear plugs.

Some employees stated that they had used ear plugs in the past on their own initiative. They complained that the plugs were not properly fitted and that they caused pressure and ringing in their ears which occurred both during and following the use of ear plugs.

During the initial interview at the receptionist desk, these complaints were overcome by explaining the purpose of the Hearing Conservation Program. Employees' fears relative to the loss of their positions or promotional opportunities were allayed even though their loss of hearing was proved. Personal advantages were pointed out to the individual, such as conservation of hearing, free audiograms, free issue of ear plugs with proper fitting under the supervision of a physician.

All referrals for audiograms have been on a strictly volunteer basis. As the program progressed and its intent was fully understood, no complaints have been registered by patients before or after audiograms and their cooperation has been excellent.

In the early stages of the work, great interest and cooperation was shown in the field measurements and field audiograms taken. In educational demonstrations in which noise intensities as high as 120 decibels were played through a special amplifying system in a quiet lecture room—thereby simulating field conditions—considerable personal interest was evidenced by questions asked afterward with the almost painful realization that high intensity noise is considerably more than a nuisance. In the fitting and issue of ear protection, employees have shown appreciation for personal fitting of plugs and many have expressed the thought that such a program should have been instituted at an earlier date. Some employees have voluntarily taken advantage of the service. Although each employee is told in a general way what his hearing range is after having an audiogram, no claims for hearing loss have been received.

Wearing of ear protection is less than 100% in force and some employees continue to work in high noise intensities without ear protection. As yet, no official instructions requiring the wearing of ear protection have been issued. Through continued efforts, particularly in audiometry and education of personnel exposed to high intensity noise, it is believed possible to achieve a degree of employee cooperation which will essentially eliminate industrial hearing loss. (Sheehan, J. R., Practical Aspects of a Hearing Conservation Program: Indust. Hyg. Quar., 17: 49-52, March 1956)

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#### Tetryl Occupational Diseases - Experimental Investigations and Prevention

Clinical and laboratory investigations were carried out on more than 200 workers employed in charging boosters with tetryl and followed up for 2 years. Thirty-seven cases of dermatitis were observed, two cases



of which appeared to be of only an allergic nature after a series of patch tests. Tetryl does not appear to be a primary irritant to the skin. Dermatographism on subjects exposed to tetryl does not differ from that of normal subjects.

Other frequent symptoms are nosebleed and headache of congestive nature, diarrhea, nervous hyperexcitability, gastroduodenitis, and liver and gall bladder disturbances. Blood picture, serum electrophoresis, and complete urinalysis were usually normal, but for an occasional finding of low grade albuminuria; toxic granulations and Heinz bodies were absent. Qualitative analysis of urine for tetryl, picric acid, and metanitroaniline were always negative.

Acute, subacute, and chronic toxicity experiments were performed on rats and rabbits. Oral daily doses of 1 gm. per kgm. (g./kg.) and 2 g./kg. kill the animals in 10 to 18 days. The histologic picture shows a severe hepatorenal degeneration. The lining cells of the renal tubules reveal earlier and more severe changes already detectable in rats treated three times every other day with oral doses of 1 g./kg. of tetryl and in rabbits treated parenterally for 15 days with 0.25 g./kg. Oral administration of 0.05 g./kg. of tetryl in rats for 3 months also induced slight degenerative changes in the liver and kidneys. The single dose of 1 g./kg. in rats proved harmless. Passive transfer experiments carried out in guinea pigs with allergic patients' serum, as well as direct sensitization in rats according to Gall's method, gave negative results.

Particular consideration has been given to the technical and medical prevention of tetryl disturbances. Working processes having been improved, tetryl concentration in the workrooms decreased from 2.6 to 1 mg. per cubic meter (mg./m<sup>3</sup>). At the beginning, groups of workers exposed to tetryl were periodically substituted for other groups; later on, the industrial hygiene conditions were notably improved and workers could permanently attend their jobs. The maximum allowable concentration of tetryl should be set at 1 mg. per cubic meter. The methods for the complete prevention of the disturbances due to tetryl are discussed. (Parmeggiani, L., Bartalini, E., Sassi, C., and Perini, A., Tetryl Occupational Diseases - Experimental Investigations and Prevention: *La Medicina Del Lavoro*, 47: 293-313, May 1956) Note: BuMed has set threshold limit at 1.5 mg./cubic meter.

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### Ventilation of Operating Theatres

(The following editorial which appeared in *The Lancet*, Saturday, December 8 1956, (Vol. CCLXXI, No. 6954, page 1197) is reprinted as a matter of interest in connection with the current problems being experienced by many hospitals with antibiotic resistant staphylococcal wound infections)

The ventilation system in an operating theatre should do four things: it should carry away dangerous bacteria liberated by the occupants; it should prevent contaminated air from entering the theatre; it should remove anesthetic gases; and it should provide comfortable working conditions. Often only this last purpose has been in the designers' minds, and even so, it is seldom achieved. In 1946, R. B. Bourdillon and L. Colebrook (*Lancet* 1946 i, 561, 601) illustrated the need for proper ventilation in operating theatres and wound dressing rooms. They showed that the commonly used exhaust fan draws contaminated air from corridors and wards into the operation room; the theatre, in fact, becomes an "air sewer" where sporing organisms can be particularly deadly. (See *Ibid*, 1953, ii, 1133; *Ibid*, July 7, 1956, p 29.) On the other hand, plenum (or pressure) ventilation with filtered heated and humidified air from outdoors reverses this flow and reduces the risk of wound infection. Pathogenic organisms liberated inside the theatre should not be swept into other parts of the hospital, so plenum ventilation is supplemented by an exhaust system of slightly smaller capacity. This carries outside most of the contaminated air and only a small amount remains to create the necessary flow from theatre to corridor.

The change from suction to pressure ventilation in an operating theatre has been shown to be followed by a reduced infection rate, although, admittedly, a surgeon making this change is likely to have revised other matters concerning wound infection. R. A. Shooter, G. W. Taylor, G. Ellis, and J. P. Ross (*Surg. Gynec. Obst.*, 1956, 103, 257) have made the same observation and they believe that the ventilation changes were entirely responsible for the improvement. They describe a theatre in which air entered near the floor and was extracted at a higher level. The benefits of plenum ventilation were lost because the extraction exceeded the input; smoke tests showed that air was being sucked from the corridor into the theatre. The extract ducts were, therefore, blocked and the input rate was increased so that the direction of flow was reversed. These changes also caused a strong horizontal cross-draught in the region of the operating table. Air sampling showed a notable reduction in the number of airborne bacteria, and, although the low levels recommended by Bourdillon and Colebrook were not achieved, wound infection fell from 8.6% to 1.0%. Although Shooter et al. believe that the change from suction to pressure ventilation reduced the infection rate, they add that the cross-draught may have helped by preventing contaminated particles from settling in the operation field—which includes not only the wound, but the instruments, towels, dressings, lotions, and other surgical impedimenta.

At present, theatres can be found with ventilation in almost any direction—upwards, downwards, sideways, or oblique, and there are theoretical arguments for and against each of these. Air may be diffused gently into the room through special distributors or blown at high velocity from



an open grille. Turnover rates vary from two or three to sixty changes an hour and it seems likely that these higher rates would not be needed if the air were used more effectively. Bannister ran the mile in less than 4 minutes not because he put more effort into the job, but because he did it more efficiently. If this principle were applied to the problems of ventilation, there would no longer be need to heat winter air from freezing-point to 75° C. and then throw it away at the rate of sixty room-fuls an hour. There is still a lot to be learned about the physics of ventilation in operating theatres. The ventilation factors which concern the clearance of contamination from an operation room and the provision of an especially safe area in the middle of it need to be worked out and then combined, perhaps by compromise, with those which influence the comfort of the occupants. It will be surprising if greater safety and better working conditions are not then achieved at lower running costs.

Our English colleagues have long been concerned with environmental transmission of pathogenic organisms and the publications of the Medical Research Council on airborne infections are vital references in terms of aseptic techniques in hospital environments.

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#### Hospital Infection

The growing problem of hospital cross-infections with antibiotic resistant staphylococci is the subject of a discussion by Dr. Emil G. Klarmann in Modern Sanitation, 8: 23, December 1956. The particular approach concerns the role of the environment and means of its disinfection. A chart illustrating the air contamination of the operating room during various phases of an operation may stimulate similar observations in hospitals having problems with wound infections. The references should also prove useful to those attempting to combat this problem.

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The printing of this publication has been approved by the Director of the Bureau of the Budget, 16 May 1955.

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#### Alumni Meeting at Brooklyn Navy Yard

On April 19, 1957, the Alumni Association of Naval Medical Officers will hold its eleventh annual meeting at the Commissioned Officers' Mess,

New York Naval Ship Yard, Brooklyn. Meetings in the past have been well attended by ranking Medical officers of the Third Naval District and by representatives of the Bureau of Medicine and Surgery.

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### Policy

The U. S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be nor are they susceptible to use by any officer as a substitute for any item or article in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

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